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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/733,226	12/10/2003	William M. Hiatt	108298744US	8010

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PERKINS COIE LLP  
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EXAMINER
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MATTHEWS, COLLEEN ANN

ART UNIT	PAPER NUMBER
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2811

NOTIFICATION DATE	DELIVERY MODE
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09/17/2010

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patentprocurement@perkinscoie.com

<b>Office Action Summary</b>	<b>Application No.</b> 10/733,226	<b>Applicant(s)</b> HIATT ET AL.	
	<b>Examiner</b> Colleen A. Matthews	<b>Art Unit</b> 2811	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 06/02/2010.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) \_\_\_\_\_ is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☐ Claim(s) \_\_\_\_\_ is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)         | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)         | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

In view of the Appeal Brief filed on 06/02/2010, PROSECUTION IS HEREBY REOPENED. New grounds of rejection are set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) initiate a new appeal by filing a notice of appeal under 37 CFR 41.31 followed by an appeal brief under 37 CFR 41.37. The previously paid notice of appeal fee and appeal brief fee can be applied to the new appeal. If, however, the appeal fees set forth in 37 CFR 41.20 have been increased since they were previously paid, then appellant must pay the difference between the increased fees and the amount previously paid.

A Supervisory Patent Examiner (SPE) has approved of reopening prosecution by signing below:

/Lynne A. Gurley/

Supervisory Patent Examiner, Art Unit 2811.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

**Claims 28 and 44 are rejected under 35 U.S.C. 102(b)** as being anticipated by U.S. Pat. No. 6,459,150 to Wu et al. (Wu).

**Re claim 28:** Freyman discloses a packaged microelectronic device comprising:  
a die (30) having a first side and a second side opposite to the first side, the die further having

an integrated circuit (34) positioned between the first and second sides;  
a bond-pad (31) positioned on the first side of the die and electrically coupled to the integrated circuit;

a passage (37) extending completely through the die and aligned with and extending through the bond-pad (see Fig 14);

a first conductive material (52) deposited in a first portion of the passage adjacent to the first side of the die to form a conductive plug electrically connected to the bond-pad; and

a second conductive material (54) deposited in a second portion of the passage in contact with the conductive plug to at least generally fill the passage from the conductive plug to the second side of the die.

**Re claim 44:** Wu discloses a microelectronic device set comprising:  
a first microelectronic device (Fig 3A-3F) having:  
a first die (80) with a first integrated circuit (col 8 line 48) and a first bond-pad (82) electrically coupled to the first integrated circuit, the first die further including a passage (76) aligned with and extending through the first bond-pad (see Fig 3B); and

a conductive interconnect (90/92) deposited in the passage, the conductive interconnect including a first conductive material (90) deposited in a first portion of the passage to form a conductive plug in contact with the bond-pad (see Fig 3E), and a second conductive material (92) deposited in a second portion of the passage in contact with the conductive plug to at least generally fill the passage (see Fig 3F); and

at least a second microelectronic device having a second die (50) with a second integrated circuit (col 1 lines 54-55) and a second bond-pad (58) electrically coupled to the second integrated circuit, wherein the second bond-pad is electrically coupled to the first bond-pad of the first microelectronic device (see Fig 3F).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

### **Claims 29-30, 33, 36, 39-41, 43, 45 and 49-52 rejected under 35 U.S.C. 103(a)**

as being unpatentable over U.S. Pat. No. 6,459,150 to Wu et al. (Wu) in view of U.S. Pat. No. 6,809,421 to Hayasaka et al. (Hayasaka).

**Re claim 33:** Wu discloses a microfeature workpiece (Fig 2A-2G) having a first side (56) and a second side opposite to the first side, the microfeature workpiece comprising:

at least one die (62);  
a bond-pad (58) formed on the first side of the microfeature workpiece;  
a passage (70) extending completely through the bond-pad and the die from the first side of the microfeature workpiece to the second side of the microfeature workpiece (see Fig 2C);

a first conductive material (90) deposited in a first portion of the passage adjacent to the first side of the microfeature workpiece to form a conductive plug in contact with the bond-pad (see Fig 2F); and

a second conductive material (92) deposited in a second portion of the passage in contact with the conductive plug to at least generally fill the passage from the conductive plug to the second side of the microfeature workpiece (see Fig 2G).

Wu fails to teach wherein the first conductive material is different than the second conductive material. Hayasaka teaches a passage (Fig 17A, 17B, for example) through die (10) with a first conductive material (15: W, Mo, Ni, Ti or their silicides; col 12 lines 55-60) deposited in a first portion of the passage to form a conductive plug and a second conductive material (8: solder; col 8 lines 1-5) in contact with the conductive plug wherein the first conductive material (15: W, Mo, Ni, Ti or their silicides; col 12 lines 55-60) is different than the second conductive material (8: solder; col 8 lines 1-5). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Wu to have the first conductive material different than the second conductive material as taught by Hayasaka

**Re claim 39:** Wu discloses a microelectronic device set comprising:

Art Unit: 2811

a first microelectronic device (Fig 3A-3F, 80) having:

a first die (80) with a first integrated circuit (col 8 line 48) and a first bond-pad (82) electrically coupled to the first integrated circuit, the first die further including a passage (76) extending completely through the first die and the first bond-pad (see Fig 3B); and

a conductive interconnect (90/92) deposited in the passage, the conductive interconnect including a first conductive material (90) deposited in a first portion of the passage to form a conductive plug (see Fig 3E) having a boundary in the passage, and a second conductive material deposited in a second portion of the passage in contact with the conductive plug to at least generally fill the passage (see Fig 3F); and

at least a second microelectronic device having a second die (50) with a second integrated circuit (col 1 lines 54-55) and a second bond-pad (58) electrically coupled to the second integrated circuit, wherein the second bond-pad is electrically coupled to the conductive interconnect of the first microelectronic device (see Fig 3F).

Wu fails to explicitly disclose the second conductive material in contact with the boundary of the conductive plug. Hayasaka teaches a passage (Fig 17A,17B, for example) through die (10) with a first conductive material (15: W, Mo, Ni, Ti or their silicides; col 12 lines 55-60) deposited in a first portion of the passage to form a conductive plug having a boundary insulate the passage and a second conductive material (8: solder; col 8 lines 1-5) in contact with the boundary of the conductive plug. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Wu to have the first conductive material different than the second

Art Unit: 2811

conductive material as taught by Hayasaka in order to prevent device degradation of due to diffusion of the conductive material (Hayaska col 14 lines 40-47)..

**Re claim 40:** Wu discloses the microelectronic device set of claim 39 wherein the first microelectronic device is attached to the second microelectronic device in a stacked-die arrangement (see Fig 3F).

**Re claim 41:** Wu discloses the microelectronic device set of claim 39, further comprising a solder ball (100) disposed between the conductive interconnect of the first microelectronic device and the second bond-pad of the second microelectronic device to electrically couple the first bond-pad to the second bond-pad (see Fig 3F).

**Re claim 43:** Wu discloses the microelectronic device set of claim 39 wherein the first microelectronic device (80) further includes a redistribution layer (optional layer 64, shown in Fig 2D) formed on the first die, the redistribution layer including a conductive line having a first end portion attached to the first bond-pad and a second end portion positioned outward of the first end portion, wherein the second end portion is configured to receive electrical signals and transmit the signals to at least the first integrated circuit of the first die and the second integrated circuit of the second die (col 8 lines 31-39).

**Re claims 29, 36, 45:** Wu discloses packaged microelectronic device of claims 28, 33, and 44 as above. Wu fails to disclose an insulative layer deposited in the passage between the die and the first and second conductive materials. Hayasaka teaches (Fig 17A and 17B) an insulative layer (14) deposited in the passage between the die (10) and the first and second conductive materials (15 & 8). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify



Art Unit: 2811

Wu to include the insulative layer as taught by Hayasaka in order to insulate the die from the via to prevent short circuiting.

**Re claim 30:** Wu discloses packaged microelectronic device of claim 39 as above. Wu fails to disclose an insulative layer deposited in the passage between the first die and the first and second conductive materials. Hayasaka teaches (Fig 17A and 17B) an insulative layer (14) deposited in the passage between the first die (10) and the first and second conductive materials (15 & 8). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Wu to include the insulative layer as taught by Hayasaka in order to insulate the die from the via to prevent short circuiting.

**Re claims 49-52:** The packaged microelectronic device of claims 28, 33, 39 and 44 wherein the second conductive material contacts the conductive plug. Wu fails to disclose an insulative layer deposited in the passage, wherein the second conductive material contacts the insulative layer. Hayasaka teaches (Fig 17A-17B) an insulative layer (14) deposited in the passage, wherein the second conductive material (8) contacts the conductive plug (15) and the insulative layer (14). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Wu to include the insulative layer as taught by Hayasaka in order to insulate the die from the via to prevent short circuiting.

**Claims 31, 34 and 46 are rejected under 35 U.S.C. 103(a)** as being unpatentable over U.S. Pat. No. 6,459,150 to Wu et al. (Wu) in view of U.S. Pub. No.

Art Unit: 2811

2004/0087441 to Hirakata et al. (Hirakata) or U.S. Pat. No. 6,459,150 to Wu et al. (Wu) in view of U.S. Pat. No. 6,809,421 to Hayasaka et al. (Hayasaka) in view of U.S. Pub. No. 2004/0087441 to Hirakata et al. (Hirakata)

**Regarding claims 31, 34 and 46**, Wu discloses the device of claims 28, 33 and 44 as above including the first conductive material in contact with an exposed surface of the bond-pad. Wu fails to disclose wherein the first conductive material includes an electronic ink. Hirakata teaches a first conductive material (conductive paste; paragraph 102) includes an electronic ink (ink jetting; paragraph 102) in contact with an exposed surface of the bond-pad. It would have been obvious to one of ordinary skill in the art at the time the invention was made to form the first conductive material including electronic ink as taught by Hirkata because with electronic printing processes the plug only needs to be formed in the desired area therefore wasted material is reduced.

**Claims 32, 35 and 47 are rejected under 35 U.S.C. 103(a)** as being unpatentable over U.S. Pat. No. 6,459,150 to Wu et al. (Wu) in view of U.S. Pub. No. 2004/0087441 to Bock et al. (Bock) or or U.S. Pat. No. 6,459,150 to Wu et al. (Wu) in view of U.S. Pat. No. 6,809,421 to Hayasaka et al. (Hayasaka) in view of U.S. Pub. No. 2004/0087441 to Bock et al. (Bock).

**Regarding claims 32, 35 and 47**, Wu discloses the device of claims 28, 3 and 44 as above including the first conductive material in contact with an exposed surface of the bond-pad. Wu fails to disclose wherein the first conductive material includes a nano-particle deposition. Bock teaches using a nano-particle process to deposit a conductive

Art Unit: 2811

material (abstract lines 15-20). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Wu to have the first conductive material includes a nano-particle deposition as in Bock in order to deposit fine features.

**Claims 42 is rejected under 35 U.S.C. 103(a)** as being unpatentable over U.S. Pat. No. 6,459,150 to Wu et al. (Wu) in view of U.S. Pat. No. 6,809,421 to Hayasaka et al. (Hayasaka) in view of U.S. Pat. No. 6,982,487 to Kim et al. (Kim)

**Re claim 42:** Wu discloses the microelectronic device set of claim 39 wherein the passage (76) is a first passage. Wu fails to disclose wherein the second microelectronic device further includes a second passage extending through the second die and the second bond-pad, and wherein the second passage is completely filled with a third conductive material. Kim teaches a first microelectronic device (Fig 16, 46) with a first passage extending through a first bond pad (31) including a first conductive material (52) and a second conductive material (54) and a second microelectronic device (see Fig 17) further including a second passage extending through the second die and a second bond-pad where the second passage is completely filled with a third conductive material. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Wu to include a second passage in the second microelectronic device as taught by Kim in order to provide interconnection for the devices.

/Lynne A. Gurley/

Supervisory Patent Examiner, Art Unit 2811